REMARKS

The office action of 11/07/2003 has been reviewed and its contents carefully noted. Reconsideration of this case, as amended, is requested. Claims 1 through 35 remain in this case, claims 31-35 being added by this response.

Preliminary Comments

The numbered paragraphs below correspond to the numbered paragraphs in the Office Action.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on September 8, 2003 includes a U.S. Patent with a transposed patent number. The correct patent number is U.S. Patent No. 6,382,512.

The applicant thanks the examiner for having corrected the number and initialed the PTO form - 1449.

4. Claim 17 is objected to because of the following informalities: the recited limitation, "the reader" lacks antecedent basis. The examiner respectfully suggests amending it by - the scanning engine --. Appropriate correction is required.

Applicant thanks the Examiner for pointing out the informalities. Appropriate correction is done. Specifically,

"the reader" is changed to -- the scanning engine --.

Reconsideration and withdrawal of the objections are respectfully requested.

Rejection(s) under 35 U.S.C. §102

6. Claims 1, 5, 9-12, 14-17, 19, 20, 24, 27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Ahmed et al. (US 5,602,885).

The Office Action states, in part:

Re claims 1, 9, and 14-17, Ahmed discloses a method for inspecting a workpiece comprising a plurality of parts (tube with girth weld 30; col. 4, 11. 13-17), comprising the steps of.

a) moving the workpiece (26) relative to a scanning engine (line scan camera 62 illuminates the workpiece);

b) detecting a **line image** across the workpiece with the scanning engine (col. 5, ll. 26-29) producing a signal output representative of the line image (col. 5, 11. 30-44);

c) deriving a processed signal (by a digitizer 72) from the signal output of the scanning engine (col. 4, lines 41-42);

d) comparing the processed signal to **a** reference (**a maximum and minimum reflectance standard; col. 6, ll. 26-39**) representing a workpieee without missing parts (col. 4, lines 55+);

e) indicating if the processed signal does not match the reference (**col. 7, 11. 29-51**).

Claim 1, recites:

1. A method of detecting **missing parts** in a workpiece comprising a plurality of parts, comprising the steps of:

a) moving the workpiece relative to a scanning engine;

b) detecting **a line image** across the workpiece with scanning engine, producing a signal output representative of **the line image**;

c) deriving **a processed signal** from the signal output of the scanning engine;

d) comparing **the processed signal** to **a reference signal** representing a workpiece without missing parts; and

e) indicating if **the processed signal** does not match **the reference**.

Ahmed teaches an automatic inspection of nuclear **fuel rods**, wherein the **girth welds** joining the end plugs and the hollow tubes of nuclear fuel rods are inspected automatically using a technique that **averages** reflectance values, compares the reflectance values to standards defined as **proportions of the average**, and counts **adjacent pixels** outside the standards to analyze for defects exceeding a minimum defect size. The minimum defect size is checked by counting the **adjacent pixels** in mutually **perpendicular** directions, such as **rows and columns** in the **collected matrix of pixel data**. The maximum count in the two directions can be different, for profiling the maximum acceptable defect as to the direction of its extension relative to the tube and/or weld. Tubes are inspected prior to surface treatments that may conceal defects. The tube is fed, illuminated and rotated for **at least one revolution** at an inspection station, collecting line scans at regular angles synchronously with rotation using a line scan camera coupled to a

digitizer **to obtain the matrix** of data encompassing **the girth weld**. A numerical processor **averages**, compares and counts the number of **adjacent pixels** for assessing weld quality. (emphasis added)

As can be seen, Ahmed in related to the inspection of nuclear **fuel rods** having **girth welds** joining the end plugs. Ahmed involves an averaging of reflected values arriving at a standard that is the result of the **proportions of the average**. Ahmed further involves counts **adjacent pixels** outside the standards. A **matrix of pixel data** having or reflecting a plurality of "reflective intensities" is counted. In other words, a matrix of pixel reflectance data is collected in Ahmed during rotation of the fuel rod through at least one revolution is represented. See Figure 5 of Ahmed.

However, Ahmed does not teach the "method of detecting **missing parts** in a workpiece comprising a plurality of parts" as claimed in the instant invention. The inspection of nuclear **fuel rods** having **girth welds** joining the end plugs has no missing parts in the sense of a workpiece having a plurality of parts. In other words, the reflectance values, be they averaged or not averaged, denote something that is there on the **fuel rods.** Being on the fuel rods, the reflectance values cannot be simultaneously missing. Defective girth welds joining end plugs of a fuel rod has nothing to do with the "method of detecting **missing parts** in a workpiece comprising a plurality of parts". Furthermore, nowhere in Ahmed is the teaching of detecting **missing parts** in a workpiece comprising a plurality of parts taught or suggested. In other words, no parts are missing in Ahmed whereby detection of the parts is necessitated.

Therefore, method of detecting **missing parts** in a workpiece comprising a plurality of parts" as claimed is not taught or suggested by Ahmed.

Further, Ahmed does not teach the "detecting **a line image** across the workpiece with scanning engine, producing a signal output representative of **the line image**". Ahmed teaches the detection of defective girth welds NOT detecting **missing parts** in a workpiece comprising a plurality of parts. Further, Ahmed teaches using pixels NOT line images. In addition, the derived signal is related to the line image as claimed, but NOT related to pixels as in Ahmed.

Still further, Ahmed does not teach "comparing **the processed signal** to **a reference signal** representing a workpiece without missing parts". As argued above, the claimed processed signal is NOT what the Ahmed teaches. Further, the claimed **reference signal** is NOT what Ahmed teaches in that the referenced signal is representative of the workpiece without missing parts NOT a standard defined as proportions of the average reflectance values as taught in Ahmed.

Yet still further, Ahmed does not teach the "indicating if **the processed signal** does not match **the reference**", because the claimed **processed signal** and reference are not taught by Ahmed. (See argument supra)

Therefore, it is respectfully suggested that the rejection of independent claim 1 as being anticipated by *Ahmed* is overcome. Dependent claims 9 and 14-17, being dependent upon and further limiting independent claim 1, should also be allowable for that reason, as well as for the additional recitations they contain.

In addition, Applicant respectfully reminds the Examiner that the limitations of claims 9, 15-16 are NOT addressed by the instant Office Action. Therefore, the rejection of claims 14-17 is deemed overcome in this regard. Said limitations are highlighted **in bold** for the Examiner's convenience. Specifically, claim 9 recites:

9. (Previously presented) The method of claim 1, in which the step of deriving a processed signal comprises producing an integral signal level representing **an average level** of the signal output of the scanning engine, and the step of comparing comprises comparing the integral signal level to a reference signal level.

As can be seen, in Ahmed, the averaged reflectance is or is related to the standard for comparison because the comparing standards are defined as proportions of the average. A result may occur in that an identical value is used to compare with itself. Therefore, if claim 9 reads on Ahmed, an illogical or useless result may occur in that the integral signal level is used to compare NOT with some other values, but with itself, which seems very much meaningless.

Further, claim 15 recites:

15. (Original) The method of claim 14, in which the workpiece is illuminated so that light reflects off the workpiece, and **the linear image is produced from a reflected light image of the workpiece.**

The girth weld of Ahmed cannot produce the claimed linear image relating to a missing part.

Still further, claim 16 recites:

16. (Previously presented) The method of claim 14, in which the workpiece is illuminated **from behind,** such that the workpiece is between the illumination and the scanning engine, and the linear image is produced by the parts blocking light from the illumination.

With regard to claim 16, the highlight limitation is something that the Examiner has allowed in other allowed claim, specifically clam 30 of the instant Office Action, in its statement of reasons for the indication of allowable subject matter the Office Action, in part, states:

> the cited prior arts of record do not show the claimed method and a system for detecting a missing part of a workpiece comprising, among other things, a binary number in which each bit representing a detection or non-detection part and the workpiece being moved in a start-stop motion relative to a reader and the line image is detected while the workpiece is stationary. The missing part detecting system further comprises **a light source that is located behind the workpiece**, such that the light from the light source silhouettes the workpiece, and the line image is detected by light blocked by parts or passed where there are not parts. Furthermore, the method includes a signal processing circuit utilizing mathematical integration of an output signal from a light sensitive array and calculating an area under a measured output curve, and the reference being a voltage.

Therefore, by the Examiner's own admission, claim 30 is allowable subject matter. Claim 16 being substantially similar in its limitation with claim 30 ought to be deemed allowable. The allowance of the same is respectfully requested.

Furthermore, claims 5, 10-12 being dependent claims, by virtue of their dependency are deemed patentable.

With regard to claim 19, the Office Action states:

Re claims 19. 20, 24, and 29, Ahmed discloses a method for inspecting a workpiece comprising a plurality of parts (tube with girth weld 30; col. 4, 11. 13-17), comprising the steps of:

a) a light source (64) for illuminating the workpiece (26);

b) a light sensitive array for detecting a line image of the workpiece, produced by said light source, having a signal output representative of the detected line image (Fig. 3 and 4); and

c) a signal processing circuit (processor) having an input coupled to the signal output of the light sensitive array (pixel array), and an output, such that the signal output of the light sensitive array is compared to a reference signal (a maximum and minimum reflectance standard; col. 6, 11. 26-39) representative of a complete workpiece without missing parts, and the output of the signal processing circuit producing a signal when the comparison indicates a part is missing (accept/reject signal).

Claim 19 recites:

19. (Previously presented) A missing part detection system for detection of **missing parts in a workpiece having a plurality of parts**, comprising:

a) a light source for illuminating the workpiece; and

b) a light sensitive array for **detecting a line image** of the workpiece, produced by said light source, having a signal output representative of the **detected line image**; and

c) a signal processing circuit having an input coupled to the signal output of the light sensitive array, and an output, such that **the signal output of the light sensitive array** is compared to **a reference signal** representative of **a complete workpiece without missing parts**, and the output of the signal processing circuit producing a signal when the comparison **indicates a part is missing**.

Ahmed teaches an automatic inspection of nuclear **fuel rods**, wherein the **girth welds** joining the end plugs and the hollow tubes of nuclear fuel rods are inspected automatically using a technique that **averages** reflectance values, compares the reflectance values to standards defined as **proportions of the average**, and counts **adjacent pixels** outside the standards to analyze for defects exceeding a minimum defect size. The minimum defect size is checked by

counting the adjacent pixels in mutually perpendicular directions, such as **rows and columns** in the **collected matrix of pixel data**. The maximum count in the two directions can be different, for profiling the maximum acceptable defect as to the direction of its extension relative to the tube and/or weld. Tubes are inspected prior to surface treatments that may conceal defects. The tube is fed, illuminated and rotated for **at least one revolution** at an inspection station, collecting line scans at regular angles synchronously with rotation using a line scan camera coupled to a digitizer **to obtain the matrix** of data encompassing **the girth weld**. A numerical processor **averages**, compares and counts the number of **adjacent pixels** for assessing weld quality. (emphasis added)

As can be seen, Ahmed in related to the inspection of nuclear **fuel rods** having **girth welds** joining the end plugs. Ahmed involves an averaging of reflected values arriving at a standard that is the result of the **proportions of the average**. Ahmed further involves counts **adjacent pixels** outside the standards. A **matrix of pixel data** having or reflecting a plurality of "reflective intensities" is counted. In other words, a matrix of pixel reflectance data collected during rotation of the fuel rod with its casing having cap welded thereon through at least one revolution is represented. See Figure 5 or Ahmed.

However, Ahmed does not teach the "missing part detection system for detection of **missing parts in a workpiece having a plurality of parts**" as claimed. The inspection of nuclear **fuel rods** having **girth welds** joining the end plugs has no missing parts. In other words, the reflectance values, be they averaged or not averaged, denotes something that is there on the **fuel rods** system. Even if a defect in welding exists, there is no missing part involved. In other words, a defective girth welding is NOT a missing part. Therefore, being on the fuel rods or the casing thereof, the reflectance values, by its very nature, cannot be simultaneously missing.

Furthermore, nowhere in Ahmed is the teaching of a light sensitive array for **detecting a line image** of the workpiece, produced by said light source, having a signal output representative of the **detected line image** taught or suggested. In other words, Ahmed teaches using pixels NOT line images. In addition, the detected line image is related to the line image as claimed, but NOT related to pixels as in Ahmed.

Still further, nowhere in Ahmed is the teaching of"a signal processing circuit having an input coupled to the signal output of the light sensitive array, and an output, such that **the signal output of the light sensitive array** is compared to **a reference signal** representative of **a complete workpiece without missing parts**, and the output of the signal processing circuit producing a signal when the comparison **indicates a part is missing**" taught or suggested. In other words, the claimed **reference signal** is representative of **a complete workpiece without missing parts**, NOT an averaged reflectance value as in Ahmed. And the claimed **signal output of the light sensitive array** is related to a line image NOT pixels as taught by Ahmed.

Therefore, it is respectfully suggested that the rejection of independent claim 19 as being anticipated by *Ahmede* is overcome. Dependent claims 20, 24, 27, and 29, being dependent upon and further limiting independent claim 19, should also be allowable for that reason, as well as for the additional recitations they contain. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection(s) under 35 U.S.C. §103

8. Claims 2, 3, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahmed et al. (US 5,602,885) in view of Ledvina et al. (US 4,509,323).

Ledvina teaches a power transmission chain for a sprocket drive is constructed of at least two types of toed links, one engaging sprocket teeth with their outside flanks and the other engaging sprocket teeth with their inside flanks. The links are assembled as uniform sets of links of the same type, in a regular or random mixture of sets. To **distinguish** the types of links, one type has a curved or arcuate back and the other a flat, generally planar back. An improperly located link can be easily detected in the assembly of links.

However, Ledvina does NOT teach the detection of missing part. There are no missing parts involved therein.

As an initial matter, claims 2, 3, and 21-23 being dependent claims are deemed patentable by virtue of their respective dependency upon independents claims 1 and 19 respectively.

In addition, a fundamental notion of patent law is the concept that invention lies in the new combination of old elements. Therefore, a rule that every invention could be rejected as obvious by merely locating each element of the invention in the prior art and combining the references to formulate an obviousness rejection is inconsistent with the very nature of "invention." Consequently, a rule exists that a combination of references made to establish a *prima facie* case of obviousness must be supported by some teaching, suggestion, or incentive contained in the prior art which would have led one of ordinary skill in the art to make the claimed invention.

As argued supra, the Ahmed reference does NOT discloses an optical scanning engine to inspect a **missing part** in a workpiece having multiple parts. It may be true that Ahmed further discloses that the optical scanning engine scans the workpiece, but the signal from the scanning engine is NOT the signal output representative of the line image. Therefore, the claimed processed signal from the signal output of the scanning engine is NOT taught in Ahmed because no line image related signal is taught therein. In addition, the standard reflection data taught in Ahmed is NOT what is claimed as the reference in the instant application.

The Examiner has admitted that Ahmed does not show a parallel-link chain in a container.

In addition, Applicant fails to understand the relevancy of the following statement of the instant Office Action, which is listed below for the convenience of the Examiner. Applicant respectfully request the Examiner to point out the relevancy of the same with claims 2, 3, and 21-23.

> Ledvina et al. discloses a parallel-link chain (Fig. 2) having two types of links with a distinguishable physical characteristic from each other. He discloses the links are painted with different colors (selecting colors are designers choice but it would be obvious to select colors distinctive to each other. One of ordinary skills in the art preferably selects a dark color such as black to minimize noise in detecting a reflected light.) and illuminated by a light. An optical detector detects the reflected light and examines for the appropriate color spectrum. Then the link type is verified (page 3-4, (6) of the description of the preferred embodiments).

The Office Action further states:

In view of Ledvina, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to further substitute the workpiece of Ahmed with a parallel-link chain of Ledvina since both are scanned by an optical scanning engine. Whether the optical scanning engine scans a workpiece (26) or a parallel-link chain, the scanning engine provides the same fundamental functions of scanning a piece of material for identifying a defective or missing part in a workpiece. Furthermore, such modification of substituting a workpiece of Ahmed with a parallel-link chain would have been an obvious matter of user preference, and therefore an obvious expedient.

As an initial matter, NO **chain guide** is taught or suggest in either Ahmed or Ledvina. Applicant respectfully reminds the Examiner that all claim limitations must be considered, especially when missing from prior art in the determination of an obviousness rejection.

Therefore, claims 22 and 23 which have the limitation of a **chain guide** is deemed patentable.

Even if a chain guide is mentioned in the references (which is not the case), the inquiry is not whether each element existed in the prior art, but whether the invention as a whole is obvious in light of the prior art. *Hartness International, Inc. v. Simplimatic Engineering Co.*, 819 F.2d 100, 2 U.S.P.Q.2d 1826 (Fed. Cir. 1987)

Furthermore, the proposed modification of Ledvina would not be made when Ledvina is considered as a whole. "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986).

Still further, Even if Ahmed and Ledvina could be properly combined, the combination of the references would not form the presently claimed invention. The present invention is directed towards missing part detection system for detection of missing parts in a workpiece having a plurality of parts. Even if Ahmed and Ledvina could be properly combined, the combination of Ahmed and Ledvina would not form the presently claimed invention in Claims 2, 3, and 21-23. Instead, a combination of Ahmed and Ledvina would result in a girth weld automatic inspection system wherein the chains of Ledvina has to be rotated at least once for a determination involving pixels denoting reflectance. And having an average of the reflecting

pixel values form a reference value, which is NOT missing part detection system for detection of missing parts in a workpiece having a plurality of parts, and having the claimed reference be related to the workpiece with NO missing parts. Alternatively, the combination would result in a chain having two or more types of links without any links missing and having the chain subject to be rotated at least once for a determination involving pixels denoting reflectance. In neither case would the combination teach or suggest Applicant's missing part detection system for detection of missing parts in a workpiece having a plurality of parts, and having the claimed reference be related to the workpiece with NO missing parts.

Reconsideration and withdrawal of the rejection of claims 2, 3, and 21-23are respectfully requested.

9. Claims 4, 6-8, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahmed et al. (US 5,602,885) in view of Marwin (US 5,280,162).

Marwin teaches a bar code laser scanning system operable in a continuous scan mode and a sleep mode. A circuitry is provide whereby if no object is present for scanning within the scanning field, the sleep mode is activated to thereby prolong the life of the laser scanning system.

In addition, a fundamental notion of patent law is the concept that invention lies in the new combination of old elements. Therefore, a rule that every invention could be rejected as obvious by merely locating each element of the invention in the prior art and combining the references to formulate an obviousness rejection is inconsistent with the very nature of "invention." Consequently, a rule exists that a combination of references made to establish a *prima facie* case of obviousness must be supported by some teaching, suggestion, or incentive contained in the prior art which would have led one of ordinary skill in the art to make the claimed invention.

As argued supra, Ahmed reference does NOT discloses an optical scanning engine to inspect a **missing part** in a workpiece having a plurality of parts. It may be true that the Ahmed further discloses that the optical scanning engine scans the workpiece, but the signal from the scanning engine in Ahmed is NOT the signal output representative of the line image. Therefore,

the claimed processed signal from the signal output of the scanning engine is NOT taught in Ahmed because no line image related signal is taught therein. In addition, the standard reflection data taught in Ahmed is NOT what is claimed as the reference in the instant application.

The Examiner has admitted that Ahmed does not explicitly show the deriving step further comprising the steps of amplifying an output from the scanning engine and filtering the amplified output.

However, applicant argues that it would NOT have been obvious to an artisan of ordinary skill in the art at the time the invention was made to further incorporate the amplifier and a filter, as taught by Marwin, to the teachings of Ahmed for the purpose of decoding a bar-coded symbol in a more precise manner. Furthermore, Applicant respectfully submits that all claim limitations must be considered, especially when missing from prior art.

Additionally, in comparing Marwin to the claimed invention, the claim limitations of the presently claimed invention may not be ignored in an obviousness determination.

The present invention in claim 6 recites:

6. (Previously presented) The method of claim 5, further comprising the step of providing **scannable indicia** on at least one side of the workpiece, in position **to be imaged by the scanning engine** along with the line image of the workpiece, and the step of extracting uses **the imaged scannable indicia** as a marker to determine the **data analysis window**. (emphasis added)

Such a set of highlighted features in bold is not taught or suggested by Marwin. Therefore, claim 6 is not obvious in view of Marwin.

The present invention in claim 7 recites:

7. (Original) The method of claim 6, in which the **scannable indicia** are **bar codes**. (emphasis added)

Such a set of highlighted features in bold is not taught or suggested by Marwin. Therefore, claim 7 is not obvious in view of Marwin.

The present invention in claim 8 recites:

8. (Original) The method of claim 6, in which **scannable indicia** are provided on each end of the workpiece, and **the data analysis window** is taken between the **detected scannable indicia.** (emphasis added)

Such a set of highlighted features in bold is not taught or suggested by Marwin. Therefore, claim 8 is not obvious in view of Marwin.

Furthermore, even if all the limitations are listed in the cited references, which are NOT the case, **stating that it is obvious to try or make a modification or combination without a suggestion in the prior art is not *prima facie* obviousness.**

The mere fact that a prior art reference can be readily modified does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Laskowski*, 871 F.2d 115, 10 U.S.P.Q.2d 1397 (Fed. Cir. 1989) and also *see In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992) and *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1993). The Examiner may not merely state that the modification would have been obvious to one of ordinary skill in the art without pointing out in the prior art a suggestion of the desirability of the proposed modification.

The present invention in claims 6 and 8 includes the feature of **scannable indicia** which may be a bar code for forming a **data analysis window** for detecting missing parts using line images. In contrast, Marwin teaches a bar code laser scanning system operable in a continuous scan mode and a sleep mode. Further, in Marwin a circuitry is provide such that if no object is present for scanning within the scanning field, the sleep mode is activated to thereby prolong the life of the laser scanning system, but does NOT teach or suggest the feature of **scannable indicia** which may be a bar code for forming a **data analysis window** for detecting missing parts using line images.

Reconsideration and withdrawal of the rejection are respectfully requested.

Allowable Subject Matter

10. Claims 13, 18, 26, 28, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant gratefully acknowledges Examiner's statement that claims 13, 18, 26, 28, and 30 are allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. They are respectively rewritten in independent form.

Independent claims 31, 32, 33, 34, and 35 are respectively claims 13, 18, 26, 28, and 30 re-written in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant believes the claims, as amended, are patentable over the prior art, and that this case is now in condition for allowance of all claims therein. Such action is thus respectfully requested. If the Examiner disagrees, or believes for any other reason that direct contact with Applicants' attorney would advance the prosecution of the case to finality, he is invited to telephone the undersigned at the number given below.

"Recognizing that Internet communications are not secured, I hereby authorize the PTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record in the application file."

Respectfully Submitted:
Mark E. Patton

By: _____
Frank F. Tian Reg. No. 46,462
Agent for Applicant

BROWN & MICHAELS, P.C.
400 M&T Bank Building - 118 N. Tioga St.
Ithaca, NY 14850
(607) 256-2000 • (607) 256-3628 (fax)
e-mail: tian@bpmlegal.com
Dated: January 5, 2004